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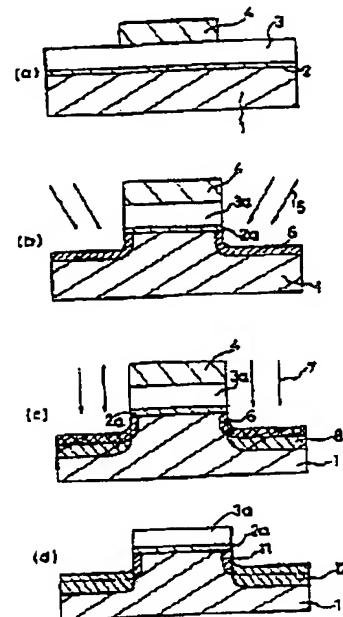
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TITLE : SEMICONDUCTOR DEVICE AND
 MANUFACTURE THEREOF



ABSTRACT : PURPOSE: To improve controllability of the shape of a gate electrode, by forming a dug part of a semiconductor substrate in a self-alignment manner with an upper gate electrode, forming a diffusion layer of low impurity concentration on the side surface of the substrate dug vertically to the semiconductor substrate, and forming a diffusion layer of high impurity concentration on the bottom surface of the dug substrate.

CONSTITUTION: Phosphorus ions as impurity ions 5 are implanted to be about $1 \times 10^{13}/\text{cm}^2$, obliquely to the main surface of a substrate 1. Thereby a region 6 of low impurity concentration region is formed the side wall and the bottom of the dug substrate 1 to the inside of the substrate 1. The depth of the region 6 is about $0.1\mu\text{m}$, and the impurity concentration is about $10^{18}\text{-}10^{19}\text{cm}^{-3}$.

Phosphorus ions as impurity ions 7 are implanted to be about $6 \times 10^{15}/\text{cm}^2$, vertically to the main surface of the substrate 1. Thereby a region 8 of high impurity concentration is formed from the bottom of the dug substrate 1 to the inside of the substrate. The depth of the region 8 is $0.3\mu\text{m}$, and the impurity concentration is $1\text{-}2 \times 10^{20}/\text{cm}^3$. Hence controllability of the shape of a gate electrode is excellent, and resistance value of the gate electrode is not increased.

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